Basic Information

Öhlins Shock Absorber

Owner's Manual

ÖHLINS®
ADVANCED SUSPENSION TECHNOLOGY

Introduction

Öhlins Racing AB - The Story

It was the 1970's, a young man named Kenth Öhlin spent most of his spare time pursuing his favourite sport: motocross.

A careful observer, Kenth's attention was continually drawn to one specific detail - motocross bikes had more engine power than their suspension could handle.

It was not long before Kenth realised that better performance could be achieved by improved wheel suspension.

Öhlins Racing was established in 1976, and just two years later the company won its first World Championship title. Despite being in the business for 30 years, the search for perfection and new functions is still the main focus of the company.

Congratulations! You are now the owner of an Öhlins Shock Absorber. More than one hundred World Championships and other major world titles are definitive proof that Öhlins shock absorbers offer outstanding performance and reliability.

Every product has gone through rigorous testing and engineers have spent thousands of hours, doing their very best to use every possible experience from our 30 years within the racing sport.

The product that you now have in your possession is pure racing breed that is built to withstand.

By installing this shock absorber on your vehicle you have made a clear statement… you are a serious rider with a focus on getting the maximal handling ability and outstanding feedback from your vehicle. Along comes the fact that your shock absorber will be a long lasting friend, delivering the very best of comfort and performance every time you go for a ride.

Go explore!

Note!

The shock absorber is a very important part of the vehicle and will therefore affect the stability of the vehicle.

Read and make sure that you understand the information in this manual and the mounting instructions before you use this product. If you have any questions regarding installation or maintenance please contact your nearest Öhlins dealer.

Öhlins Racing AB can not be held responsible for any damage to the shock absorber, vehicle, other property or injury to persons, if the instructions for installing and maintenance are not followed exactly.

⚠ Warning!

This product was developed and designed exclusively for a specific vehicle model and should only be installed on the intended vehicle model in its original condition as delivered from the vehicle manufacturer.

⚠ This product contains pressurized nitrogen gas (N^2). Do not open, service or modify this product without proper education (authorized Öhlins dealer/distributor) and proper tools.

⚠ After installing this product, take a test ride at low speed to make sure that your vehicle has maintained its stability.

Note!

When working on this product, always consult your Vehicle Service Manual.

This Manual should be considered as a part of the product and should therefore accompany the product throughout its life cycle.

Safety Symbols

In this manual, mounting instructions and other technical documents, important information concerning safety is distinguished by the following symbols:

⚠

The Safety Alert Symbol means: Warning! Your safety is involved.

⚠ Warning!

The Warning Symbol means: Failure to follow warning instructions can result in severe or fatal injury to anyone working with, inspecting or using the shock absorber, or to bystanders.

Caution!

The Caution Symbol means: Special precautions must be taken to avoid damage to the shock absorber.

Note!

The Note Symbol indicates information that is important regarding procedures.

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Design and Functioning

Most of Öhlins suspensions are a high pressure monotube type. The fluid is put under gas pressure and the gas and the fluid are kept apart by a separating piston. The piston is usually fitted in an external reservoir, connected by a hose (Fig. 4) or fixed directly on top of the shock absorber (Fig 3). In some models everything is fitted inside the main shock absorber (Fig 2). A few shock absorbers are of emulsion type, oil and gas mixed inside the shock absorber (Fig 1). In some models an internal gas reservoir is separated from the tube by a base plate (Fig. 5). The oil flow is controlled by the base plate before it reaches the dividing piston.

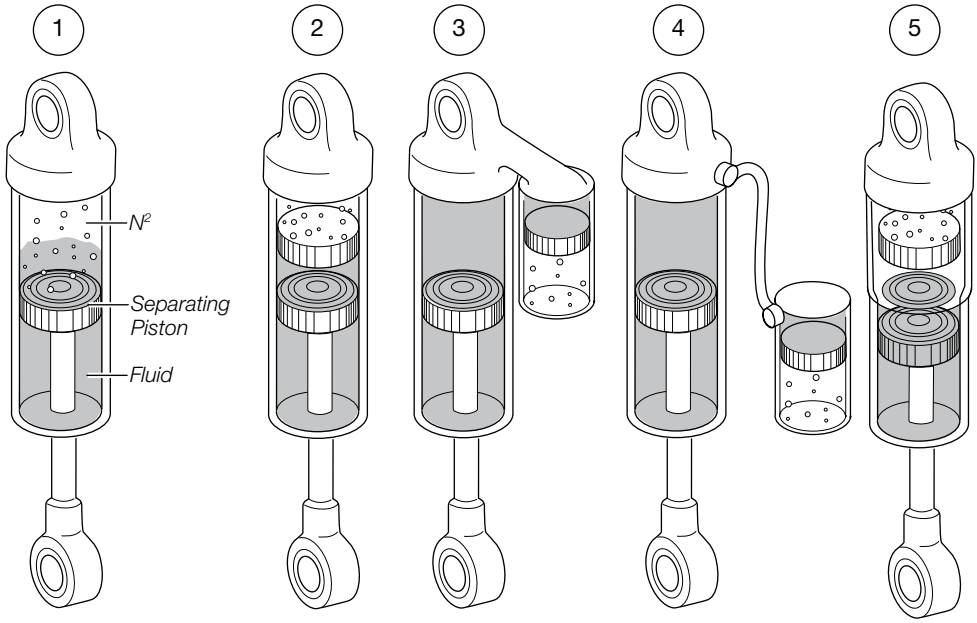
The fluid is pressurized by nitrogen (N^2). The pressurisation prevents cavitation of the fluid and the shock absorbing action is therefore more even. The external reservoir also contributes to better cooling of the fluid, giving longer service life for the fluid as well as the components.

Öhlins shock absorbers with external rebound adjustment have an integrated temperature compensation.

As the temperature increases and the fluid flows more easily the flow is controlled accordingly. The shock absorbing effect is therefore independent of the temperature.

The more advanced models permit individual adjustment of compression and rebound damping.

Öhlins shock absorbers provide the possibility of adjustment, making them adaptable to most vehicles, drivers and ranges of use. All of the shock absorbers with springs have adjustable preload of the spring action.



Fluid is forced through needle valves at a low rate of flow (Fig 6) and through a number of orifices in the piston (Fig 7) at a high rate of flow. The flow through these orifices is regulated by shims (thin steel washers) that at high pressure are deflected to open for the fluid. On most models the needle valve can be adjusted from the outside.

By altering the size of the shim-stack (Fig 8) (i.e. number, thickness, diameter) the characteristics of the damping action can be changed. *This should only be done by an authorized Öhlins service workshop.*

Compression damping

When movement of the vehicle causes compression of the shock absorber, the fluid flows through the needle valve (combined compression and rebound valve) in the piston rod. If the velocity of the compression movement is high, i.e., in the case of rapid compression, this will not be sufficient and consequently the shims underneath the piston will open to allow for a greater rate of flow. The fluid that is displaced by the volume of the piston rod is forced into the external reservoir via a separate compression valve. The separating piston is displaced, thus increasing the gas pressure.

Rebound damping

When the spring forces the shock absorber to extend again, the fluid flows back through the needle valve. The fluid flowing into the chamber is forced by the pressure of the gas back into the shock absorber via a separate one way valve. If the piston velocity is high, the shims on top of the piston will also open to allow the fluid to flow through.

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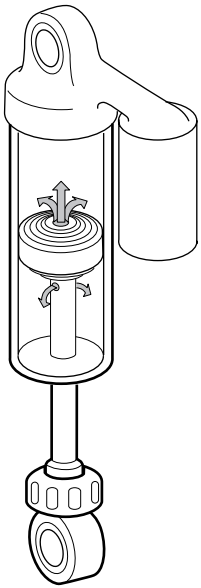

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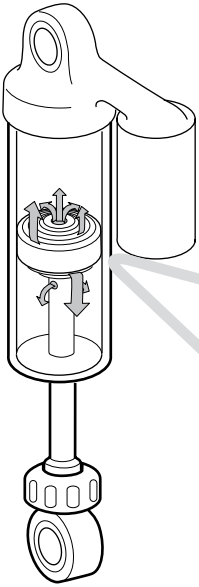

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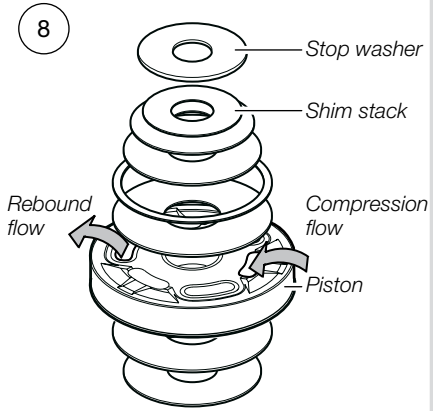


Adjustments

⚠ Warning!

Before driving your vehicle, make sure that the basic settings made by Öhlins are intact.

By using the adjustment possibilities you can test by trial and error, and learn how they work.

Always begin by taking a test ride with all adjustments at their basic setting. Choose a short run with varying character, long and sharp bends, hard and soft bumps. Stay on this run and adjust only one setting at a time.

Start with Rebound Damping

If the vehicle feels unstable, loose and rather bouncy, increase the rebound damping. Turn the adjuster knob 4 clicks (steps) clockwise. Test run again and adjust two clicks counter clockwise if it feels too hard and bumpy.

If the vehicle feels hard and bumpy, especially over a series of bumps, reduce the rebound damping. Turn the adjuster knob counter clockwise 4 clicks, take a test run and, if necessary, adjust 2 clicks clockwise.

Compression Damping

If the vehicle feels soft, has a low riding position and a tendency to bottom easily in long dips, increase the compression damping. Turn the adjuster 4 steps, take a test run. If necessary, adjust 2 clicks counter clockwise.

If the vehicle feels harsh and has hard resilience, for example over changes in the road paving, reduce the compression damping. Turn the adjuster 4 clicks counter clockwise. Take a test run and, if necessary, adjust two clicks clockwise.

Note!

Make sure that the springs are properly preloaded before you make any other adjustments. A simple rule; Increased spring preload should be followed by an increase of rebound damping.

Note!

If you can not feel the clicks (steps), the shock absorber must be inspected by an authorized Öhlins Service Centre. The problem can be caused by incorrect or lack of gas pressure.

Stability

All vehicles are designed with a suspension geometry including wheel movement and angles. Changing components will affect this, therefore it is essential that the rear and the front end match each other. Changing to Öhlins suspension gives the best performance only when the front and the rear suspensions interact properly. Read the manual carefully and contact your nearest Öhlins dealer if you have any questions regarding this shock absorber.

Spring action

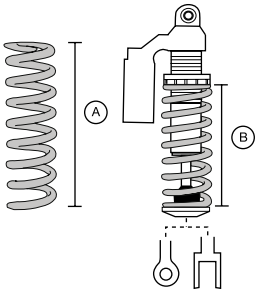
Incorrect spring action can affect the stability of the vehicle in a negative way. It can lead to some over- or understeering, and consequently affect the stability of the vehicle. It is important to use the correct spring for your shock absorber. If you have any questions regarding the spring on your shock absorber, please contact your nearest Öhlins dealer.

The adjustment possibilities on the Öhlins shock absorbers enable fine tuning. You can optimize the shock absorber to suit your own vehicle's weight and equipment, your individual way of driving and the condition of the road. To improve the stability it is very important that you understand how the shock absorber works.

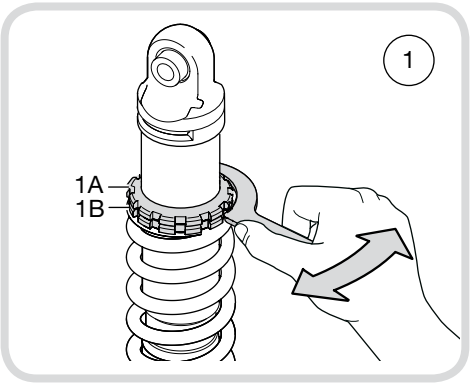
Spring Preload

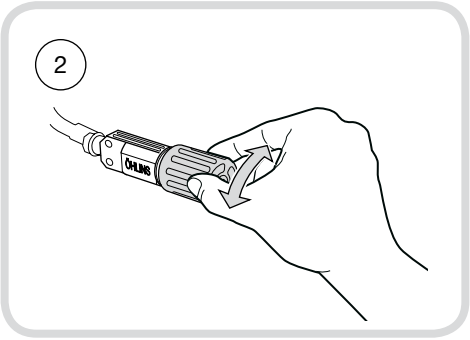
When adjusting the spring preload you move the spring seat. This will decrease or increase the initial spring force, which will lower or raise the ride height. The spring preload is fundamental for the function of the suspension. If the preload is incorrectly set, other adjustments of the shock absorber will not help to get the intended performance from the suspension.

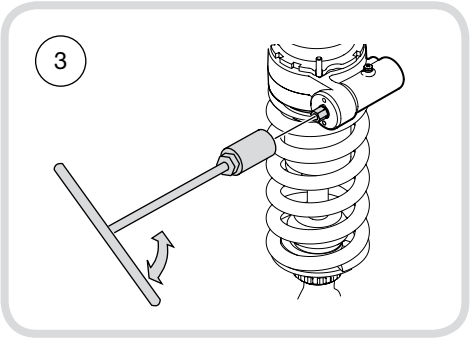
Spring Preload, the difference between A and B:



A *Free spring length*
B *Installed spring length (shock absorber fully extended)*
A-B = Spring Preload







How to Set the Spring Preload

1 Mechanical Adjuster

Use a C-spanner. Loosen the lock nut (1A). Move the lower spring platform (1B) to the desired position. Turn clockwise to increase the preload, turn counter clockwise to decrease it.

2 Hydraulic Adjuster

Turn the Hydraulic Adjuster knob to set the spring preload. Turn clockwise to increase the preload and turn counter clockwise to decrease.

3 Integrated Hydraulic Adjuster

Turn the hexagon screw on the hydraulic adjuster to set the spring preload. Turn clockwise to increase, turn counter clockwise to decrease.

Compression and Rebound

Compression and Rebound Damping

Compression damping controls the energy absorption when the shock absorber is compressed, thus controls how easy the shock absorber compresses when the wheel is being loaded or hits a bump.

Rebound damping controls the energy absorption when the shock absorber is being extended and controls how fast the shock absorber returns to its normal position after being compressed.

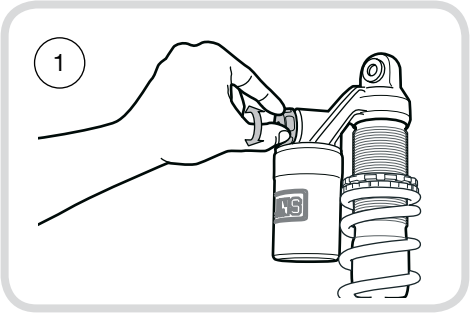
Adjust compression and rebound damping by turning the adjusters. The adjusters have a normal right hand thread.

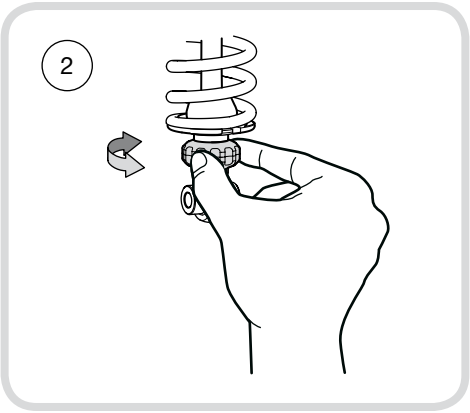
To reset

Turn the adjuster clockwise to fully closed position (position zero [0]). Then, turn counter clockwise to open, and count the clicks until you reach the recommended number of clicks. See recommended Set-up data in the Mounting Instructions for the shock absorber. Contact an Öhlins distributor if you have any questions regarding correct spring set-up.

Caution!

Do not use force, delicate sealing surfaces can be damaged.



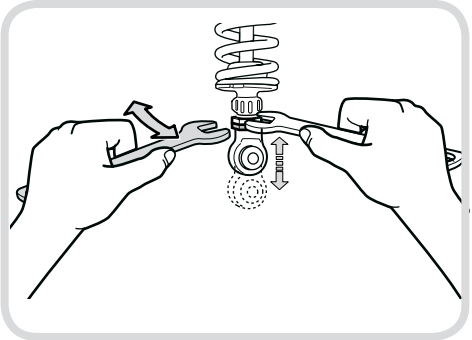


Shock Absorber Length

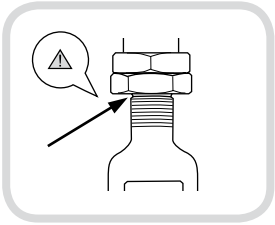
On some Öhlins shock absorber models you can adjust the length. By adjusting the length of the shock absorber the geometry can be changed.

How to Adjust the Length

We advise to remove the shock absorber from the vehicle before adjusting the length. Use two 24 mm wrenches. Hold the upper nut with one hand and at the same time loosen the lock nut (lower nut). Turn the end eye/bracket to the desired length. One [1] turn is 1 mm of shock absorber length. Please make sure to measure the ride height before and after adjusting the length.



Tightening torque: 40 Nm



⚠ Warning!

Remember to lock the lock nut after adjusting the length.

⚠ Warning!

The adjustable end eye/bracket must not be threaded out more than that the groove is fully visible beneath the lock nut. This is maximum length.

👁 Note!

After adjusting the length, check the headlight angle.

Inspection and Maintenance

Preventive maintenance and regular inspection reduces the risk of functional disturbance. If there is any need for additional service, please contact an authorized Öhlins workshop.

Cleaning

Clean the shock absorber externally with a soft detergent. Use compressed air. Be careful that all dirt is removed. Lift the bump rubber and clean the area below. Keep the shock absorber clean and spray it with oil (WD40, CRC 5-56 or equivalent) after washing. Wipe off excessive oil with a cloth.

Caution!

Never spray water directly into the adjuster knobs and/or the ball joints.

Inspection

1. Check ball joints for possible excessive play or stiction.
2. Check the piston shaft for leakage and damage.
3. Check the shock absorber body for external damage.
4. Check the reservoir for external damage that can restrict the floating piston from moving freely.
5. Check for excessive wear of rubber components.
6. Check the attachment points of the shock absorber to the vehicle.

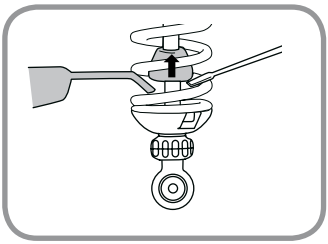
Recommended Service Intervals

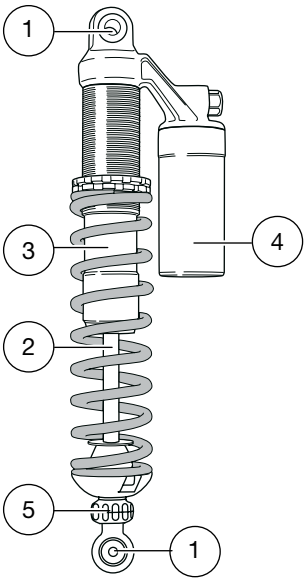
Racing: Every 10 hours of operation. Maximum 20 hours of operation without service and oil change.

Regular street use: Every 30 000 km

Disposal

Discarded Öhlins products should be handed over to an authorized Öhlins workshop or distributor for proper disposal.





Note!

The Öhlins shock absorber should only be filled with the Öhlins High Performance Shock Absorber Fluid. Contact your Öhlins dealer for advise.

Warning!

Never alter the gas pressure. Special purpose charging equipment and access to nitrogen is required.

www.ohlins.se

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